

ABSTRACT OF THE DISCLOSURE

A fuel injector incorporates a flow control into the needle valve and valve body to regulate fuel flow through the injector. The flow control defines an initial pilot fuel flow path that is closed by needle valve movement away from the nozzle seat. A primary fuel flow path requires axial movement of the needle valve through a mid-range position in which neither fuel flow paths are open. At low engine speeds, the needle valve is not driven through its mid-range position and closes prior to being driven to its fully open position, resulting in a pilot injection. At higher engine speeds, the needle valve is driven through its mid-range position eliminating a distinct pilot injection to provide only rate shaping.

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